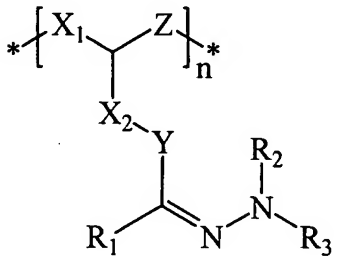
CLAIMS

What is claimed is:

1. An organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(a) a charge transport material comprising a polymer having the formula:



where X_1 and X_2 are, each independently, a bond or a linking group;

Y comprises a bond or an arylamine group;

Z comprises a bond, O, S, or NR_4;

R_1 and R_4 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group;

R_2 and R_3 comprise, each independently, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one; and

(b) a charge generating compound.

2. An organophotoreceptor according to claim 1 wherein Y comprises a carbazolyl group or an (N-substituted)arylamine group.

3. An organophotoreceptor according to claim 1 wherein X_1 and X_2, each independently, comprise a bond or a $-(CH_2)_m-$ group, where m is an integer between 1 and 10, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an

alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

4. An organophotoreceptor according to claim 3 wherein m is 1.

5. An organophotoreceptor according to claim 1 wherein the photoconductive element further comprises a second charge transport material.

6. An organophotoreceptor according to claim 5 wherein the second charge transport material comprises an electron transport compound.

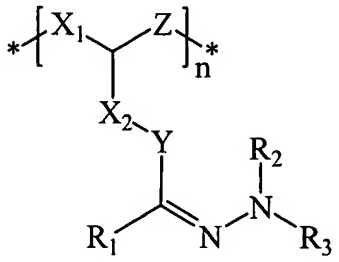
7. An organophotoreceptor according to claim 1 wherein the photoconductive element further comprises a binder.

8. An electrophotographic imaging apparatus comprising:

(a) a light imaging component; and

(b) an organophotoreceptor oriented to receive light from the light imaging component, the organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising:

(i) a charge transport material comprising a polymer having the formula



where X_1 and X_2 are, each independently, a bond or a linking group;

Y comprises a bond or an arylamine group;

Z comprises a bond, O, S, or NR4;

R_1 and R_4 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group;

R_2 and R_3 comprise, each independently, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one; and

(ii) a charge generating compound.

9. An electrophotographic imaging apparatus according to claim 8 wherein Y comprises a carbazolyl group or an (N-substituted)arylamine group.

10. An electrophotographic imaging apparatus according to claim 8 wherein X_1 and X_2, each independently, comprise a bond or a $-(CH_2)_m-$ group, where m is an integer between 1 and 10, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

11. An electrophotographic imaging apparatus according to claim 10 wherein m is 1.

12. An electrophotographic imaging apparatus according to claim 8 wherein the photoconductive element further comprises a second charge transport material.

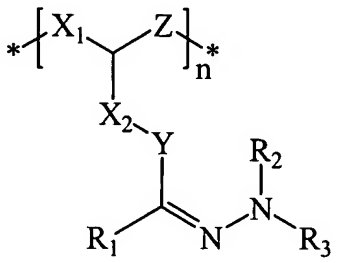
13. An electrophotographic imaging apparatus according to claim 12 wherein second charge transport material comprises an electron transport compound.

14. An electrophotographic imaging apparatus according to claim 8 further comprising a toner dispenser.

15. An electrophotographic imaging process comprising;

(a) applying an electrical charge to a surface of an organophotoreceptor comprising an electrically conductive substrate and a photoconductive element on the electrically conductive substrate, the photoconductive element comprising

(i) a charge transport material comprising a polymer having the formula



where X_1 and X_2 are, each independently, a bond or a linking group;

Y comprises a bond or an arylamine group;

Z comprises a bond, O, S, or NR4;

R_1 and R_4 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group;

R_2 and R_3 comprise, each independently, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one; and

(ii) a charge generating compound.

(b) imagewise exposing the surface of the organophotoreceptor to radiation to dissipate charge in selected areas and thereby form a pattern of charged and uncharged areas on the surface;

(c) contacting the surface with a toner to create a toned image; and

(d) transferring the toned image to substrate.

16. An electrophotographic imaging process according to claim 15 wherein Y comprises a carbazolyl group or an (N-substituted)arylamine group.

17. An electrophotographic imaging process according to claim 15 wherein X_1 and X_2, each independently, comprise a bond or a $-(CH_2)_m-$ group, where m is an integer between 1 and 10, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

18. An electrophotographic imaging process according to claim 17 wherein m is 1.

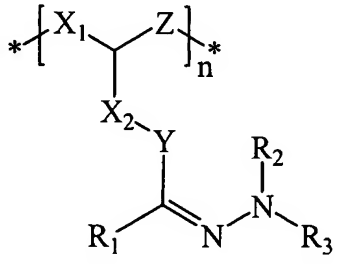
19. An electrophotographic imaging process according to claim 15 wherein the photoconductive element further comprises a second charge transport material.

20. An electrophotographic imaging process according to claim 19 wherein the second charge transport material comprises an electron transport compound.

21. An electrophotographic imaging process according to claim 15 wherein the photoconductive element further comprises a binder.

22. An electrophotographic imaging process according to claim 15 wherein the toner comprises colorant particles.

23. A charge transport material comprising a polymer having the formula



where X_1 and X_2 are, each independently, a bond or a linking group;

Y comprises a bond or an arylamine group;

Z comprises a bond, O, S, or NR4;

R_1 and R_4 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group;

R_2 and R_3 comprise, each independently, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one.

24. A charge transport material according to claim 23 wherein Y comprises a carbazolyl group or an (N-substituted)arylamine group.

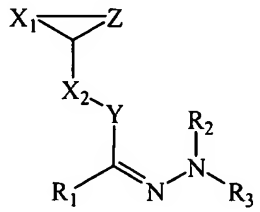
25. A charge transport material according to claim 23 wherein X_1 and X_2, each independently, comprise a bond or a $-(CH_2)_m-$ group, where m is an integer between 1 and 10, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

26. A charge transport material according to claim 25 wherein m is 1.

27. A charge transport material according to claim 25 wherein Y is a carbazolyl group.

28. A charge transport material according to claim 25 wherein R_2 and R_3 are, each independently, an aryl group.

29. A method for forming a charge transport material comprising a polymer, the method comprising the step of ring-open polymerizing a charge transport material having the formula:



where X_1 and X_2 are, each independently, a bond or a linking group;

Y comprises a bond or an arylamine group;

Z comprises a bond, O, S, or NR4;

R_1 and R_4 comprise, each independently, H, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group; and

R_2 and R_3 comprise, each independently, an alkyl group, an alkenyl group, an alkynyl group, an aromatic group, or a heterocyclic group.

30. A method for forming a charge transport material according to claim 29 wherein Y comprises a carbazolyl group or an (N-substituted)arylamine group.

31. A method for forming a charge transport material according to claim 29 wherein X_1 and X_2, each independently, comprise a bond or a $-(CH_2)_m-$ group, where m is an integer between 1 and 10, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group.

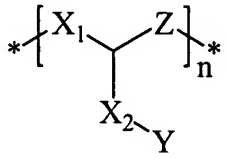
32. A method for forming a charge transport material according to claim 31 wherein m is 1.

33. A method for forming a charge transport material comprising a polymer, the method comprising the steps of:

a) reacting a polymer comprising molecules having repeating arylamine groups with an acylating agent to form an aldehyde derivative or a ketone derivative; and

b) reacting the aldehyde derivative or the ketone derivative with an (N,N-disubstituted)hydrazine.

34. A method for forming a charge transport material according to claim 33 wherein the polymer comprising molecules having repeating carbazolyl groups or arylamine groups has the following formula:



where X_1 and X_2, each independently, comprise a bond or a $-(CH_2)_m-$ group, where m is an integer between 1 and 10, inclusive, and one or more of the methylene groups is optionally replaced by O, S, N, C, B, Si, P, C=O, O=S=O, an NR_a group, a CR_b group, a CR_cR_d group, or a SiR_eR_f where R_a, R_b, R_c, R_d, R_e, and R_f are, each independently, a bond, H, a hydroxyl group, a thiol group, a carboxyl group, an amino group, an alkyl group, an alkoxy group, an alkenyl group, an alkynyl group, a heterocyclic group, an aromatic group, or a part of a ring group;

Y comprises a bond or an arylamine group;

Z comprises a bond, O, S, or NR4 ; and

n is a distribution of integers between 1 and 100,000 with an average value of greater than one.

35. A method for forming a charge transport material according to claim 34 wherein m is 1.

36. A method for forming a charge transport material according to claim 33 wherein the acylating agent is a mixture of phosphorus oxychloride and an N,N-dialkylamide.

37. A method for forming a charge transport material according to claim 35 wherein the N,N-dialkylamide is N,N-dimethylformamide.